

REMARKS

Claims 1-13 are pending in this application. Applicants submit the following remarks regarding the patentability of the claims.

35 U.S.C. 103 Rejections

Claims 1-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,294,519 to Mori or European patent application EP 0178864 in view of U.S. Patent 6,593,249 to Meyer. Applicants respectfully traverse the rejection.

The Invention

The subject matter of the present invention relates to a method of forming a conductive pattern on dielectric substrates covered with a metal film, preferably a layer of copper.

As set forth in claim 1 the method comprises the following different steps, a) a substrate covered with a metal film is coated with a protective layer which is formed by treating the metal film with a solution containing at least one compound containing nitrogen, b) the protective layer is stripped (ablated) away by ultraviolet (UV) radiation at least partially in the regions not corresponding to the conductive pattern to be formed, in such a way that the metal film is exposed, and c) the exposed metal film is removed by etching.

(1) EP 0178864 A2

In European patent application EP 0178864 A2 which is one of the primary references cited by the Examiner in the rejection, a process is disclosed for producing a copper through-hole printed circuit board, which comprises forming a desired pattern on a copper-clad laminated plate by screen printing using a resist ink with a negative image soluble in an alkaline aqueous solution. Then the copper-clad laminated plate is immersed in an aqueous solution of an alkylimidazole salt to form on the copper surface of the plate an etching resist film, composed of the alkylimidazole compound. This is followed by

drying the resulting plate and then treating it with an alkaline etching solution. At the end of the process the alkylimidazole coating is dissolved and removed.

(2) U.S. Patent 5,294,519 A

U. S. Patent 5,294,519 A to Mori teaches a process of preparing a printed circuit board. The process involves the different steps of forming a photosensitive resist film on a plate, applying a pattern mask onto the photosensitive resist film to form a negative pattern, exposing the film through the pattern mask to an actinic radiation, and developing the resulting film and etching the surface thereof to obtain the circuit pattern (Example 1; col. 8,9).

As stated on page 3 of the Office Action of August 21, 2003, the Examiner admits that neither EP 0178864 nor the Mori reference teaches the use of a laser to form a conductive pattern on a dielectric substrate. Then, the Examiner opines that it allegedly would have been obvious to one of ordinary skill in the art to arrive at the present invention based on the teachings of U.S. Patent to Meyer.

(3) U.S. Patent 6,593,249 to Meyer

Firstly, it is respectfully submitted that the Examiner's combination of either European Patent application EP 0178864 or U.S. Patent 5,294,519 with U.S. Patent 6,593,249 to Meyer is improper since the priority date of the Meyer reference (March 7, 2001) is after the priority date of the present application (September 10, 1999). Accordingly, it is submitted that the Examiner has not made a prima facie case that the invention is obvious over the above-mentioned combination of references since one of ordinary skill in the art could not have been able to look to the teachings of the Meyer reference to arrive at the present invention. It is submitted that the Examiner has used improper hindsight in making the rejection. In re Rouffet, 47 USPQ2d 1453 (Fed Cir. 1998).

Notwithstanding the above grounds for traversal of the rejection set forth in the Office Action, applicants further submit that the invention of the instant application is not obvious over the proffered combination of references. The cited reference, U.S. Patent 6,593,249 B2, describes a method of forming metal pattern, in which, in addition to other

steps, a layer of varnish is applied onto the substrate and the layer of varnish is ablated by using an ultraviolet laser beam in at least those regions that do not correspond to the areas where it is desired that a metal pattern be formed. Then, the base metal surface is laid bare and is etched. When the process is done, the layer of varnish has been stripped in the desired places.

It is submitted that the disclosure of the Meyer reference does not provide one of ordinary skill with a motivation, suggestion or teaching to arrive at the claimed invention when combined with the teachings of U.S. Patent 5,294,519 to Mori or European Patent application EP 0178864. The Meyer reference simply does not teach what is lacking from the primary references.

The processes set forth in EP 0178864 and U.S. Patent 5,294,519 are far afield from the claimed process of applicant's invention. Regarding the obviousness rejection, as the Examiner stated correctly, both of the references teach far different processes with respect to the process of the present invention, although the cited references do teach forming a conductive pattern on dielectric substrates. In the above two cited references, the conductive pattern is formed by using a photosensitive resist film or an alkylimidazole coating as a protective layer which is removed by dissolving it in a liquid solution. In stark contrast, the conductive pattern in the process of the present invention is formed by using a film as protective layer, which is stripped away by UV radiation, preferably by a laser beam. The laser serves to break up the organic material of the protective layer and transfer it into the gas phase which is then exhausted. The above description emphasizes the extent to which the processes are different.

The photosensitive resist film in the European patent application and the coating in Mori are not indicated as being able to be removed by using ultraviolet (UV) radiation. For this reason, in the disclosure of neither of the two references is there a hint to remove such compositions by any way other than the known ways of photoresist exposure and developing and dissolving a pattern on the substrate in an aqueous solution, respectively. Therefore, a person skilled in the art would not have used the disclosure of reference (1) or reference (2) to arrive at a solution to the problems which the present invention solves.

As there is no suggestion as to forming a conductive pattern as claimed in the present patent application based on the teachings of the primary references EP 0178864 and U.S. Patent 5,294,519, the subject matter of the present invention would not have been obvious over the two references to one of ordinary skill in the art at the time the invention was made.

With respect to the 35 U.S.C. 103(a) combination of either EP 0178864 or U.S. Patent 5,294,519 in view of U.S. Patent 6,593,249 to Meyer, it is respectfully submitted that neither of the two primary references can be combined with the secondary reference of Meyer. When one compares the disclosures of the cited European Patent application or the Mori reference with the subject matter of the invention of the Meyer reference, one notes that the method of forming a conductive pattern on dielectric substrates is entirely different in U.S. Patent to Meyer. As described above, the process in the Meyer patent involves a step of applying a layer of varnish which is partially removed by using UV radiation. As explained above, in the above two cited primary references, the conductive pattern is formed by using a photosensitive resist film or an alkylimidazole coating as protective layer which is removed by dissolving it in a liquid solution. In stark contrast, the conductive pattern in the process of the present invention is formed by using a film as protective layer, which is stripped away by UV radiation, preferably by a laser beam. Accordingly, it is submitted that the such different processes as in the case of reference (1) or reference (2) on the one hand and, in the case of the present invention on the other hand are not comparable. The process conditions, the materials used, and the means to deposit or remove these layers are simply totally different.

Furthermore there is no hint in either the European patent application or U.S. Patent to Mori that the steps of applying photosensitive resist film or coating are can be performed in a different order or interchanged, nor is there any suggestion , teaching or motivation as to which other films are appropriate to use in the cited references.

Therefore, it is respectfully submitted that a person of ordinary skill in the art would not have looked to the disclosure of reference (1) or reference (2) in light of the teachings of the Meyer reference to combine the references or rather to exchange certain steps of the processes to arrive at the subject matter of the present invention. For this reason the subject

matter of the present invention would not have been obvious to those skilled in the art at the time the invention was made.

Furthermore, applicants emphasized that the compounds of the layer of varnish used in (3) U.S. Patent 6,593,249 to Meyer are different from the compounds used in the process of the present invention. Furthermore, there is no hint in Meyer to use compounds containing nitrogen as is claimed in applicants invention. Accordingly, even if a person skilled in the art were to combine European patent application EP 0178864 or U.S. Patent to Mori with Meyer it would not solve the problems which the present invention solves nor would one of ordinary skill arrive at the present invention.

Therefore, applicants respectfully request reconsideration of the 35 USC 103(a) obviousness rejections on the grounds that it would not have been obvious to one of ordinary skill in the art at the time the invention was made to combine references (1) or (2) in view of reference (3) to arrive at the subject matter of the present claimed invention.

Accordingly, it is requested that the 35 U.S.C. 103(a) rejections be withdrawn.

CONCLUSION

For the reasons set forth above, Applicants' present invention, as recited in the amended claims now more clearly and particularly, is patentable. If further matters remain in connection with this case, the Examiner is invited to telephone the Applicant's undersigned representative to resolve them.

Respectfully submitted,

November 17, 2003



Derek S. Jessen
Registration No. 48,213
Paul & Paul
2900 Two Thousand Market Street
Philadelphia, PA 19103
Telephone (215) 568-4900
Fax (215) 567-5057

Order No. 1877